6.1.2 Classwork

Name______________ Date________

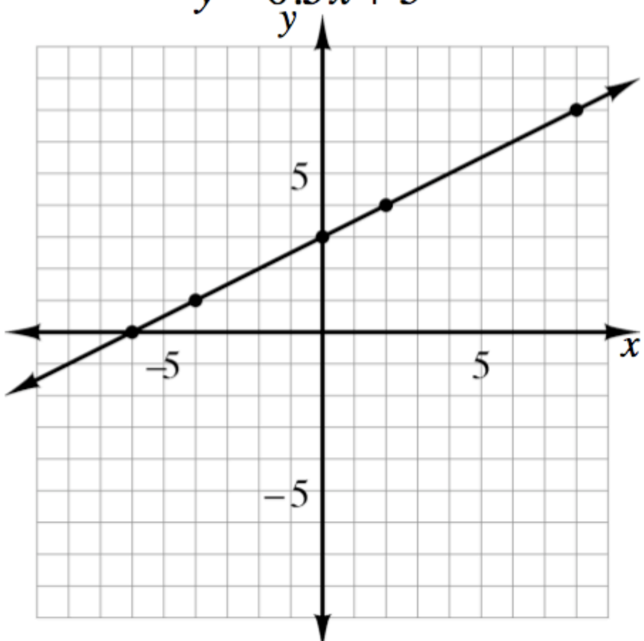
How can I find an inverse?
Using a Graph to Find an Inverse

Today's big goal We'll be introduced to the term **inverse** to describe undo rules, graph the inverse of a function, notice patterns, and write equations for inverses.

6-16 **Have a member of your group read instructions in the e-book!**
In Lesson 6.1.1 you started with functions and worked backwards to find their undo rules. These undo rules are also called **inverses** of their related functions. Now you will focus on functions and their inverses represented as graphs. Use what you discovered yesterday as a basis for answering the questions below.

a. Make a careful graph of each undo rule on the same set of axes as its corresponding function. Look for a way to graph without finding the undo rule first. Be prepared to share your **strategy** with the class.

$y = 0.5x + 3$

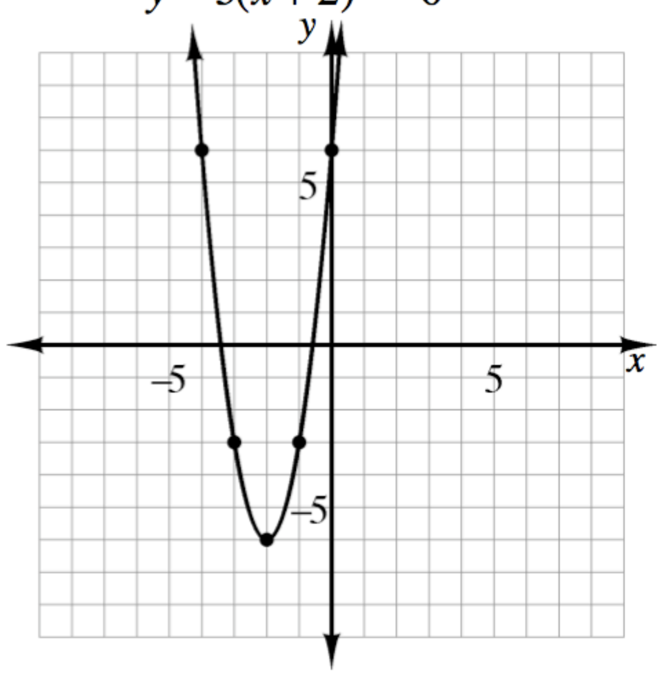


Can you find the undo rule?

Table for y=0.5x+3

Table for Undo Rule (aka Inverse)

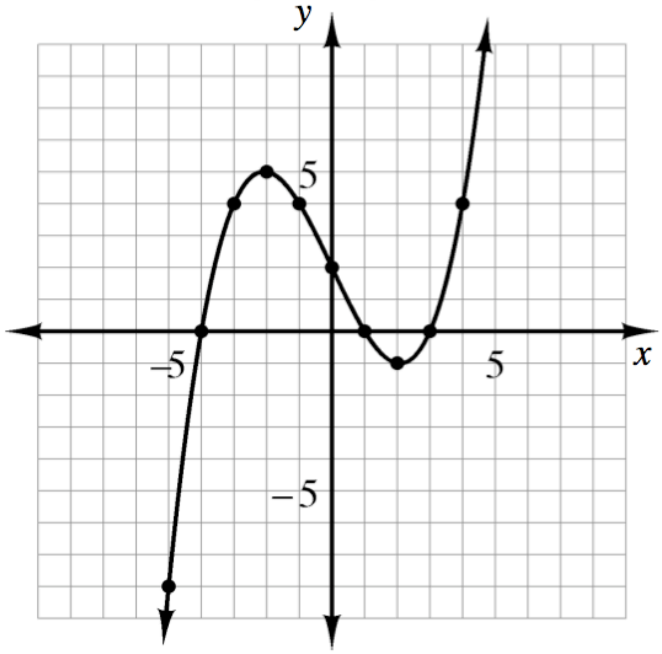
$y = 3(x+2)^2 - 6$



Can you find the undo rule?

Table for $y = 3(x+2)^2 - 6$

Table for Undo Rule (aka Inverse)

$y = \frac{1}{6}x^3 - \frac{13}{6}x + 2$ 	**Can you find the undo rule?** **Table for** $y = \frac{1}{6}x^3 - \frac{13}{6}x + 2$ **Table for Undo Rule (aka Inverse)**

b. Make statements about the relationship between the coordinates of a function and the coordinates of its inverse. Use x→y tables of the function and its inverse to show what you mean.

6-17

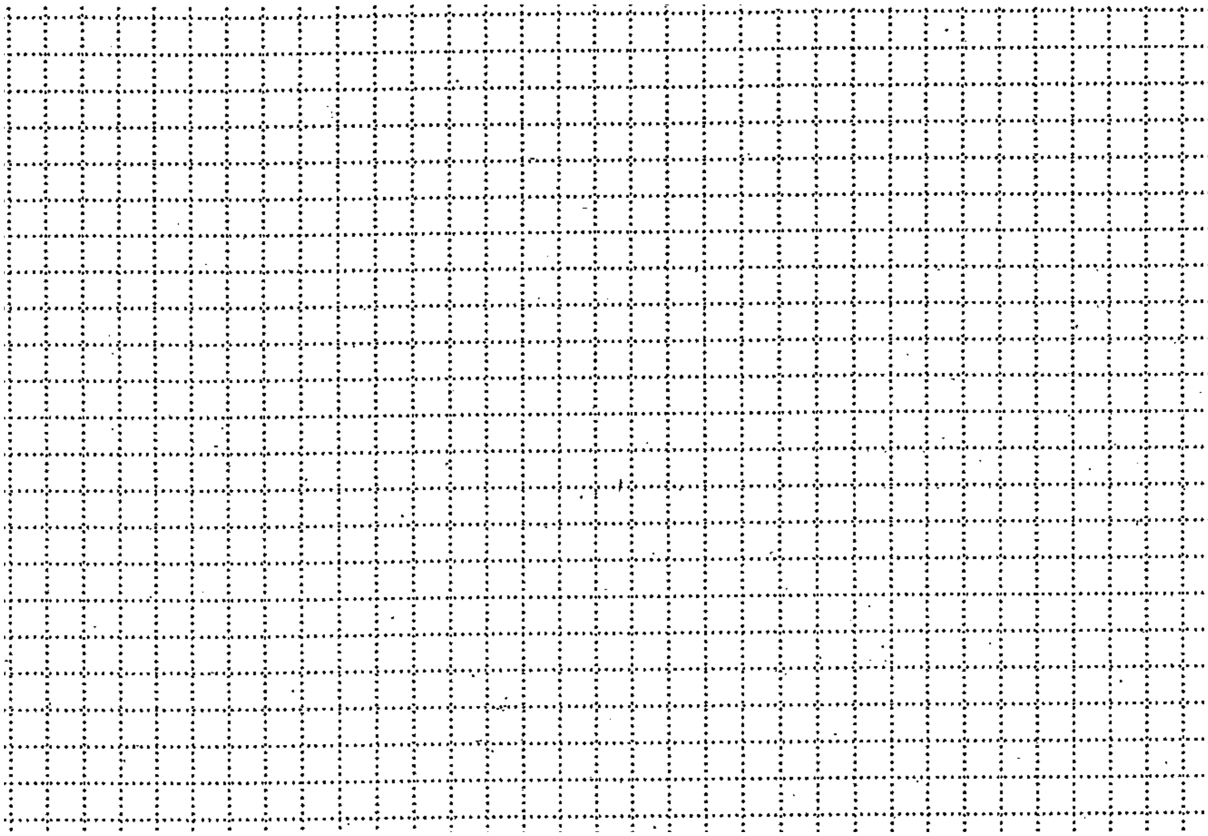
a. Draw the line of symmetry for each pair of graphs in problem 6-16.

b. Find the equations of the line of symmetry.

c. Why do you think these lines make sense as the lines of symmetry between the graphs of a function and its inverse relation?

6-18 The line of symmetry you identified in 6-17 can be used to help graph the inverse of a function without creating an x → y table.

a. Graph $y = \left(\frac{x}{2}\right)^2$ carefully below. Scale the x & y-axes the same way on your graph.



b. On the same set of axes, graph the line of symmetry y=x.

c. With a pencil or crayon, trace over the curve until the curve $y = \left(\frac{x}{2}\right)^2$ is heavy and dark. Then fold your paper along the line *y=x*, with the graphs on the inside of the fold. Rub the graph to make a "carbon copy" of the parabola.

d. When you open the paper, you should see the graph of the inverse. Fill in any pieces of the new graph that did not copy completely. **Justify** that the graphs you see are inverses of each other.

6-19

Your graphing calculator can also help you to graph the inverse of a function. Check your inverse graph from problem 6-18 by following the instructions below:

select [DRAW] (press $\boxed{\text{2nd}}$ then PRGM). Then select 8: DrawInv from the menu. The text "DrawInv" will appear on your screen. Then type in the function for which you want to graph the inverse. For example, if you want to graph the inverse of $y = (\frac{x}{2})^2$, you would enter "$(\frac{x}{2})^2$" after the text "DrawInv" appears on the screen. Then press $\boxed{\text{ENTER}}$. In order to clear the drawing of the inverse from your screen, return to the [DRAW] menu and select $\boxed{1}$: ClrDraw" from the menu.

6-20

Find the equation of the inverse of $y=\left(\frac{x}{2}\right)^2$.	Is there another way you could write it? If so, show how the two equations are the same.
Justify that your inverse equation undoes the original function and use a graphing calculator to check the graphs (it should match your careful graph on the previous page).	

6-21 Consider your equation for the inverse of $y=\left(\frac{x}{2}\right)^2$.

a. Is the inverse a function? How can you tell?

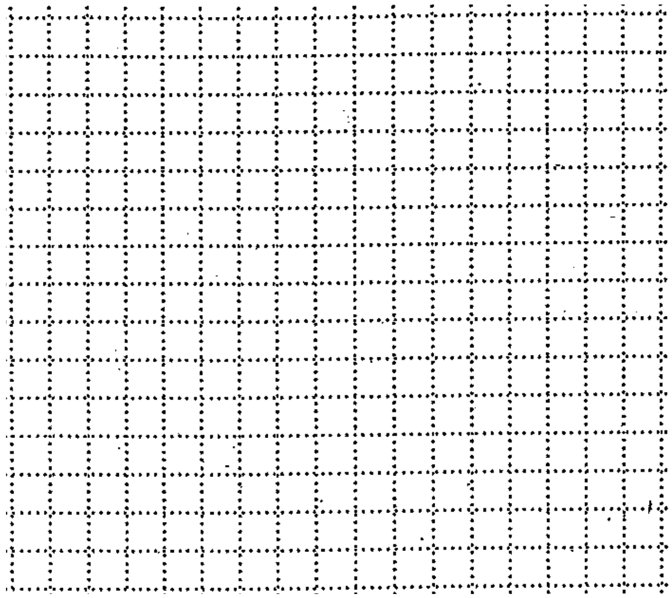
b. Use color to trace over the portion of your graph of $y=\left(\frac{x}{2}\right)^2$ for which $x \geq 0$. Then use another color to trace the inverse of *only this part* of $y=\left(\frac{x}{2}\right)^2$. Is the inverse of this part of $y=\left(\frac{x}{2}\right)^2$ a function? How can you tell?

c. Find a rule for the inverse of the restricted graph of $y=\left(\frac{x}{2}\right)^2$ (from part b). How is this rule different from the one you found in problem 6-20?

6-22 Consider the function $f(x) = (x-3)^2$.

a. How could you restrict the domain of *f(x)* so that its inverse will be a function (like you did in part b of 6-21)?

b. Graph *f(x)* with its restricted domain and then graph its inverse on the same set of axes.



c. Find the equation of the inverse of *f(x)* with its restricted domain.

6-23 Is there a way to look at any graph to determine if its inverse will be a function? Explain. Find examples of other functions whose inverses are not functions.